بسم الله الرحمن الرحيم

عنوان المحاضرة: **Non Specific Urinary Tract Infections**

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Definitions: (Exam Q)

-Bacteriuria: the presence of bacteria in the urine

-Pyuria: the presence of white blood cells (WBCs) in the urine, is generally indicative of infection and an inflammatory response of the urothelium to the bacterium.

*Bacteriuria without pyuria is generally indicative of bacterial colonization without infection of the urinary tract.

-Sterile Pyuria (Pyuria without bacteriuria): (MCQ)

Causes: -Partially treated infection -TB -Presence of stones -Cancer -Foreign Body

Newborn: infants within few hours or days up to few weeks

Infant: up to 2 years

Childhood: age span from birth to adolescence

Adulthood: Full physical & Intellectual maturity; begin at 20 - 21 yrs

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Non Specific UTI:

Definition: Group of diseases affecting the Urinary tract that have nearly similar clinical manifestations & caused by certain organisms

Causative organisms:

1-Aerobic: -E. Coli → 85% of all UTI -Proteus -Klebsiella -Pseudomonas

2-Gram positive: -S. Aureus -Steptococci group D (enterococci)

3-Chlamydia & Mycoplasma

Incidence: -Among the most common infectious diseases -More than 8 million cases annually in USA

-Male : Female: -Up to 1 year→ 2:1 - from 1-10 years → 1:10 - > 10 yrs → 1:30

-Nearly 30% of women will have had a symptomatic UTI requiring antimicrobial therapy by age 24, and almost half of all women will experience a UTI during their lifetime.

-The prevalence of bacteriuria in young women is 30 times more than in men.

Defense Mechanisms against UTI:

1-Acidic urine (normally 5.5 - 6.5) 2-Frequent & Complete Voiding

3-High concentration of Urea 4-Mucosal cell production of organic acids and antibiotics

5-Structurelly and functionally normal urinary tract

*In Males: Long urethra, meatus away from the anus, prostatic antibacterial factors secretion

*In Females: Lactobacilli which help maintain a low vaginal pH

Routes of infection: a) The ascending route b) Hematogenous spread c) Lymphatic spread

Risk factors: (Exam Q)

A) General Factors

1-Age: Extreme of age (< 1 yr & > 60 yrs)

2-Gender: More common in Females (urethra is shorter & closer to the anus)

3-Bacterial Factors: -Urea splitting organisms

4-Host Factors: -Renal insufficiency & Failure -Hospital Acquired infection (Resistant)
-Immunosuppressed patients & Diabetic patients

5-Congenital Anomalies: (Reflux – Ureterocele – PUV & PUJ obstruction)

6-Neurogenic: Voiding dysfunction 7-Indwelling Catheter 8-Urinary Obstruction

9-Pregnancy 10-Fistula (Cutaneous – Genital – Colonic) 11-FB, Stents

B) In Children: **(1% of boys & 3% of girls develop UTIs by age of 11)**

1-This includes some children who delay bathroom trip

2-Their muscles may not relax enough later to fully empty bladder & flush away any bacteria

***More regular Bathroom trips & drinking plenty of liquids may help**

3-A structural problem that obstructs urine flow or lead to urine flow back from the bladder to the kidney, → Triggering chronic kidney infections → this can lead to kidney damage

C) In Women:

1-UTIs are most common in Sexually Active women

2-Other Factors that may ↑ Risk include:

-Not drinking enough fluids -Taking frequent baths -Holding urine -Kidney Stone

Classification of NSUTI:

Simple	Complicated
Structurely & functionally Normal	Impairment
Eradicated by short course of Antibiotics	Resistant to many antibiotics
Localized	Spread to other parts of the body

-Isolated Infections:

First infections or those isolated from previous infections by at least 6 months occur in 25% to 30% of women between the ages of 30 and 40 years, but these occur infrequently in men with a normal urinary tract. About one fourth of such women experience a recurrence.

-Unresolved Bacteriuria:

The term unresolved indicates that the initial therapy has been inadequate. if any of the bacteria that caused the infection are present in the urine during therapy, regardless of how low the number, the bacteria have not been eradicated.

- Recurrent Urinary Tract Infections:

The term recurrent urinary tract infectionapplies either to reinfection from outsidethe urinary tract or to bacterial persistence in a focus withinthe urinary tract.

Correctable Urologic Abnormalities That Cause Bacterial Persistence (EXAM Q)

1-Infection stones 2-Chronic bacterial prostatitis 3-Unilateral infected atrophic kidneys

4-Ureteral duplication and ectopic ureters 5-Foreign bodies

6-Urethral diverticula and infected periurethral glands 7-Unilateral medullary sponge kidneys

8-Nonrefluxing, normal-appearing, infected ureteral stumps after nephrectomy

9-Infected urachal cysts 10-Infected communicating cysts of the renal calyces

11-Papillary necrosis 12-Perivesical abscess with fistula to bladder

Symptoms of UTI:

A) Classic:

-General: Pyerxia – Rigors – Malaise -... -Urinary: Urgency – Urine incontinence – Frequency -...

B) Other:

-Newborn: Fever – Poor Feeding -Infant: Vomitting – Diarrhea – Fever – Poor Feeding – Not Thriving

-Children: Irritability – Eating poorly – Fever that doesn't go away – Loss of bowel control – Bedwetting

Investigations:

A-Urinalysis:

***Methods of Collection:**

1-Males → Midstream Sample (in circumcised males)

2-Females →-Segmented Voided Urine Specimens (should spread the labia & wipe the periurethral area)
-Urethral Catheterization

3-Neonates & Infants → Suprapubic Aspiration under complete aseptic conditions

B-Urine Culture:

-Bacterial count > 10^5 in 2 consecutive midstream specimens or > 10^6 in a single specimen→ UTI

C-Imaging:

Indications:

1-Children less than 1 year
2-Failure of response to appropriate Antibiotics after 5 – 6 days
3-Recurrent UTI
4-Underlying risk factor

Techniques:

1-KUB (Kidneys, ureters, and bladder x-ray): useful for the rapid detection of radiopaque calculi
2-Excretory Urogram (IVU): evaluate patients with complicated infection problems
3-Voiding Cystourethrogram: important in assessing VUR
4-Renal Ultrasonography: It is particularly useful in eliminating the concern of hydronephrosis associated with UTI, pyonephrosis, and perirenal abscesses
5-Radionuclide Studies: -Gallium 67 -Indium 111labeled leukocytes

Treatment:

1-Fluoroquinolones are ideal. Aminoglycosides, Nitrofurantoin and TMP-SMX are less effective
2-IV antibiotic may be used initially to control the bacterial infection if it is severe
3-In acute cases of pyelonephritis, a 10-14 day course of antibiotics is necessary
4-Three day therapy is effective for simple cystitis in women & 7 day regimen for healthy men

***TTT of special situations:**

1-Asymptomatic ttt → in risky patients with reflux, DM, Obstruction, Pregnancy
2-Recurrent → continuous prophylaxis with either daily or weekly antibiotic
3-Pregnancy → It is safe to use Ampicillin, Nitrofurantoin, Cephalosporins
****Avoid Fluroquinolones in Pregnancy & in Children (arthropathic effect)**

Types of Renal Infections: (DEFINITIONS → Exam Q)

1-Acute Pyelonephritis:

Definition: Inflammation of renal pelvis & parenchyma, It's a clinical syndrome of chills, fever & flank pain that is accompanied by bacteriuria & pyuria

CO: usually Gram –ve organism (e.g. E.Coli)   Route of infection: Ascending route

Clinical Presentation:

***General:* -Fairly high fever (>38.5°C) -Shacking chills -Nausea & Vomiting**
****High grade fever in urology: → infection in parenchymatous organs (Kidney – Testis – Ovaries)**
***Local:* -Flank pain & tenderness usually on one side only**
-Symptoms may or may not include the symptoms of a lower UTI (Pyuria)

DD: -Basal Pleurisy -Acute Pancreatitis -Acute Cholecystitis -Acute Appendicitis

Investigations:

-Lab: Urinalysis, Urine culture   -Blood: Leukocytosis, ESR
-Radiological: -Plain X-ray -IVU -VCUG reflux

Treatment:

-General: Bed rest, analgesic & antipyretic
-Specific:
-Fluroquinolones are ideal, Combination of ampicillin & aminoglycosides may be used
-IV antibiotic may be used initially
-If antibiotic is effective→ continue ttt for 2-3 wks, If not change the AB according to culture & sensitivity

Complications:

1-Renal abscess & Curbuncle   2-Perinephric abscess
3-Bacteremia & Septic shock   4-Renal insufficiency

2-Chronic Pyelonephritis:

Definition: a variety of chronic renal lesions and has been used synonymously with interstitial nephritis, reflux nephropathy, chronic atrophic pyelonephritis, and focal coarse renal scarring.

Clinical Presentation:

-Patient may have a history of recurrent attacks of acute pyelonephritis

-Many patients diagnosed as having chronic pyelonephritis have no urologic symptoms, and the condition is discovered incidentally.

-Others are diagnosed because of symptoms related to the complications of chronic azotemia, such as hypertension, visual impairment, headaches, increased fatigue, polyuria, and polydipsia. These patients may have VUR or recurrent UTIs.

Imaging: -IVU -VCUG -Radioisotopes -DMSA

3-Renal Abscess:

Definition: a collection of purulent material confined to the renal parenchyma may follow insufficient treatment of focal bacterial nephritis

Clinical Presentation:

The patient may present with fever, chills, abdominal or flank pain, and, occasionally, weight loss and malaise. Symptoms of cystitis may occur.

4-Perinephric Abscess:

Definition: Collection of purulent material in perinephric space

Clinical presentation:

-Fever, flank or abdominal pain, chills, and dysuria; physical findings showed flank or abdominal tenderness and fever

-Patient may have scoliosis with a concavity towards the abscess.

Imaging: -U/S, CT & Percutaneous aspiration are diagnostic

TTT: Percutaneous or Surgical drainage

5-Pyonephrosis:

Definition: Three strata affection (Pelvis / Parenchyma / Perirenal fat) due to combination of infection & obstruction which lead to total loss of renal function

Clinically: (Chronic Toxemia) Pain, Toxemia, Fever, Rigors

O/E: Small tender renal swelling

US: Calcification & hydronephrosis with fluid debris level & dilated collecting system

TTT: -Massive antibiotics -US or CT guided PCN -Tube drainage -Nephrectomy for non function kidney

	Infected Hydronephrosis	Pyonephrosis
How happens?	Obstruction then Infection	Both at same time
Affection	Pelvi-Calyceal system only	Pelvi-Calyceal + Parenchyma + Perinephric tissue (3 Strata affection)
Symptoms	High grade fever, severe pain	Low grade fever, mild pain
Examination	Huge Swelling + Severe Tenderness	Just palpable mass , not tender
TTT	PCN + Further Kidney assessment	Usually Nephrectomy

Lower UTIs:

1-Cystitis:

Types: 1-Acute 2-Chronic 3-Abacterial 4-Radiation 5-Chemical 6-Interstitial

****Interstitial cystitis** (bladder pain syndrome):

-Age > 40, more common in females

-It is a chronic condition and diagnosis of exclusion of unknown cause characterized by pelvic pain.

-It may be associated with urinary urgency, urinary frequency, nocturia, and sterile urine cultures.

-It is treatable but essentially incurable condition

2-Prostatic Syndrome:

Classification:

I	Acute prostatitis	Acute infection of the prostate gland
II	Chronic bacterial prostatitis	Chronic infection of the prostate gland
III	Chronic pelvic pain syndrome (CPPS) (MCQ)	Chronic genitourinary pain in the absence of uropathogenic bacteria localized to the prostate gland with standard methodology
IV	Asymptomatic inflammatory prostatitis	White blood cells (and/or bacteria) in expressed prostatic secretions, postprostatic massage urine sediment (VB3), semen, or histologic specimens of prostate gland

*****Acute Bacterial Prostatitis***

-A rare but important lower urinary tract infectious disease.

-It is characterized by an acute onset of pain combined with irritative and obstructive voiding symptoms in a patient with manifestations of a systemic febrile illness.

- The patient typically complains of:
- Urinary frequency and urgency and dysuria
- Obstructive voiding complaints including hesitancy, poor interrupted stream, strangury, and even acute urinary retention are common.
- Perineal and suprapubic pain and may have associated pain or discomfort of the external genitalia.

-In addition, there are usually significant systemic symptoms including fever, chills, malaise, nausea and vomiting, and even frank septicemia with hypotension.

TTT: -Bed rest -Fluids -Analgesics & antipyretics
-IV antibiotics for 48 hrs then oral fluoroquinolones for 4-8 wks
-The insertion of a suprapubic cystotomy tube is the optimal therapy

Acute epididymo-orchitis:

-Route: Retrograde ascend of urethral pathogen through ejaculatory duct & vas deferens

-Etiology:

1-Sexual transmission: in men < 35 years, Chlamydia (commonest) or Gonorrhea

2-Non sexual transmission: in men > 35 years, Gram –ve bacteria (E. Coli is the commonest)
-UT abnormalities -History of UTI or TURP (Transurethral resection of the prostate)

-C/P: Fever, Swollen painful epididymis, usually associated with involvement of the testis

-O/E: Baggy tender epididymis & testis with thickened spermatic cord, some have 2ry hydrocele

-Diagnosis: -Urinalysis -C&S (culture & sensitivity) -Urethral discharge examination

-Complications: -Scrotal abscess -Testicular infarction

-TTT: -Bed rest -Fluids -Analgesics & antipyretics
-IV antibiotics for 48 hrs then oral fluoroquinolones for 4-8 wks
** Inform the patient that the swelling will take at least 4 wks to resolve

-DD of Acute Scrotum (EXAM Q)

1-Torsion of spermatic cord 2-Mumps-orchitis 3-Idiopathic edema of scrotum
4-Fat Necrosis of the scrotum 5-Strangulated hernia 6-Testicular tumors (10%)

Testicular Torsion:

Types:

1-Extravaginal Spermatic Cord Torsion **(Perinatal Testicular Torsion):**

-Perinatal spermatic cord torsion is due to rotation of the testis,entire cord, and tunica vaginalis before established fixation between the tunica vaginalis and dartos within the scrotum.

-This event is more common before birth and, depending on the timing, may present as a nonpalpable "*vanishing*" testis in a child evaluatedfor cryptorchidism or as an abnormal scrotal testis on the first postnatal examination.

2-Intravaginal Spermatic Cord Torsion:

-Predisposing factors:

1-Bell-clapper deformity 2-Cold temperature (Winter syndrome)
3-Sudden movement or trauma with activation of the cremasteric reflex
4-Rapid growth of the testis at puberty (so common in age 12-18 yrs)

-Signs and symptoms of testicular torsion include:

1-Sudden or severe pain in one testicle الألم رهيب متقدرش تفحص المريض
2-Swelling of the scrotum, which is a loose bag of skin under the penis that contains the testicles
3-Nausea 4-Vomiting 5-Abdominal pain
6-A testicle can be positioned higher than normal or at an odd angle
7-Tenderness of less than 6 hrs of duration
8-Sudden testicle pain that goes away without treatment. This can occur when a testicle twists and then untwists on its own. This is known as intermittent torsion and detorsion.

-Investigation: (جهز للعملية في نفس الوقت) -CDUS (Colour Doppler ultrasound) -CT scan

"When findings support or are suspicious for spermatic cord torsion, emergent scrotal exploration is indicated to minimize the risk of testis loss and should not be delayed to obtain scrotal ultrasonography or any other diagnostic test"

-Prognosis of saving testis according to time of the surgery:

●90% → 1st 6 hours ●50%→ after 12 hours ●10%→ after 24 hours

Treatment:

1-Preoperative manual detorsion: **based on the assumption that twisting of the testis occurs in a medial direction. Detorsion is known to be successful by dramatic relief of the pain confirmed by US**

2-Scrotal exploration:

-The affected testis should be approached first through a hemiscrotal transverse or midline incision.
-Once delivered, the surgeon should perform detorsion and document the number of cord rotations
-The testis is observed for improvement in color, but the decision to remove or retain the affected testis is subjective and, although based on the appearance of the testis.

Urethritis	**Gonococcal**	**Non Gonococcal**
Epidemiology	**Low socioeconomic**	**High socioeconomic**
Pathogen	**Neisseria gonorrhea**	**Chlamydia**
Incubation Period	**1 – 14 days (usually 2 – 5 days)**	**1 – 4 weeks**
Discharge	**Thick, profuse & yellow**	**Thin, scanty & whitish**
Gram stain	**Gram –ve intracellular diplococcic**	**Gram –ve except for infl. cells**
Treatment	**Penicillin, Ceftriaxone, Ofloxacin**	**Tetracyclines**